General environmental exposure limits beneficial effects of radical avoidance of plastics in the home

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The well-known documentary "Plastic Planet" by Werner Boote starkly illustrates the dangers of plastic and synthetics for human beings and also shows how ubiquitous plastic is. Motivated by this multiple award-winning film, a family of five from Styria completely avoided plastics in their home environment for several months. Environmental medicine experts from MedUni Vienna monitored them and analyzed their urine samples at the start of the experiment and again two months in. The main finding of this human biomonitoring study: even if one avoids plastics as far as possible in the home, a certain amount of exposure is inevitable from chemicals and from the environment. The study has now been published in the leading journal *Environmental Research*.

In the middle of November 2009, family K started to eliminate plastics from their home, the first experiment of its kind in the world. All everyday items made of plastic were replaced by corresponding plastic-free products, as far as possible. This even went as far as replacing plastic toothbrushes with toothbrushes made from wood and animal hair (pig bristles). At the same time, they took great care only to eat food that had not (or hardly) been in contact with plastic.

"There are many aspects to the plastics problem. It concerns not only plasticizers (phthalates) but also flame retardants, fragrances and dye-stuffs. For example, even very low concentrations of phthalates can affect essential biological processes such as enzyme activity or the

hormone system," explains Hans-Peter Hutter of MedUni Vienna's Institute of Environmental Hygiene. "In this human biomonitoring study, we wanted to find out whether complete avoidance of plastics could modify our bioburden."

Bioburden unchanged

The family's morning urine was measured at the start of the experiment and after a two-month period, during which they had avoided plastics at home – this only being possible to a limited extent at work and in school – to measure 14 phthalate metabolites and Bisphenol A (BPA), which have a health impact. The outcome: even though they avoided every possible contact with plastics at home, they still had a certain bioburden, so that the health effects are minimal. Hutter: "The experiment and study show: there is no way for us to avoid this exposure." Moreover, the family in question was already very aware of following a healthy lifestyle, so that their exposure to plastics was already below average. That meant that the plastic avoidance campaign had even less effect upon their bioburden. Hutter: "In their case, it was impossible to achieve any further lasting reduction in the concentration of these ever-present substances."

Call for a stricter chemicals policy

The environmental medicine experts therefore emphasize that it is very important to redouble efforts to implement a more restrictive chemicals policy, to help avoid plastics in everyday life – not only because of various substances that are harmful to health but also to avoid waste and to avoid spreading these substances into the environment (keyword: microplastics). Hutter: "For example, even just by using glass bottles instead of plastic bottles for mineral water, we could reduce environmental damage."

In some cases the harmful exposure due to individual products is very small, says Hutter. This has always been the argument put forward by individual companies. "However, what is important is the total exposure due to the widespread use of plastics. Nowadays, this is very high." Apart from plasticizers (phthalates), problematic substances include other so-called industrial chemicals, such as polybrominated diphenyl ethers, nonylphenol and Bisphenol A, which are associated with plastics. This is an area of research that the environmental medicine experts at MedUni Vienna and scientists from MedUni Vienna's Centre of Public Health have been addressing for a long time.

No home for plastics

By following the link http://www.keinheimfuerplastik.at/ you can find a blog written by the family, describing the problems they encountered when trying to avoid plastic – whether out shopping, in the kitchen or when selecting toys.

More information: Hans-Peter Hutter et al. Life without plastic: A family experiment and biomonitoring study, *Environmental Research* (2016). DOI: 10.1016/j.envres.2016.05.028

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